

spark is formed across the gap and the charge is thus conducted to earth. As now the electromotive force required to maintain an arc is much less than that required to start it across a gap, the arc is maintained by the ordinary voltage of the system, and has to be put out by some other means. Upon the methods adopted to do this Dr. Benischke bases his classification of the various arrestors as follows:—(1) An arc is not allowed to form by reason of the dividing up and cooling of the spark; (2) arc broken mechanically; (3) arc broken by a magnetic blow out; (4) arc broken by its own magnetic and thermal action; and (5) arrangements containing a large resistance in the earth connection.

This classification is all very well, but in our opinion does not give one a proper standpoint from which to judge of the value of the protection afforded.

Recent investigations have shown that the formation of an arc in the circuit of an underground cable is, in certain circumstances, attended with very grave danger. An arc in such a circuit, between horns, as, *e.g.*, in the Siemens or the Allgemeine Elektrizitäts Gesellschaft's arrestors, whether it is blown out by a magnet or by its own action on itself or other means, is very liable to produce those very rises in potential which it is the object of the arrestors to obviate. This very important consideration is not mentioned by the author. That, however, it is true is borne out by the fact that, in many English alternating-current high-tension stations, originally fitted up with spark-gap arrestors, their use has been attended with such bad results that they have been given up. Even if such so-called arrestors are scientifically good, it is very questionable if they can be made of practical service for high-tension systems by reason of their inherent want of sensitiveness. In support of this contention it may be mentioned that on p. 32 the author gives as an example of great sensitiveness the adjustment of the gap so that it will go across at double the working voltage. We are very certain, however, that there are very few high-tension underground cable systems which have such a large factor of safety. In, for example, a 5000- or 6000-volt system which has been running for some time, a rise of but 2000 or 3000 volts above the working pressure is generally sufficient to break the insulation down somewhere. In purely overhead lines the case is somewhat different, as it is very much easier here to make the insulation with a much larger safety factor.

In our opinion the proper arrestor for high-potential lines has yet to be designed. It must be so adaptable to the circuit on which it is placed that by its action no danger of rises of potential due to it can occur. By proper adjustment of its dimensions to the electrical constants of the circuit this can, perhaps, be arranged.

The arrestors classified by the author under No. 5 are, in our opinion, the most hopeful. In places like South Africa, where static charges are of constant occurrence, this form is the only one that has given any good result, on, of course, low-tension circuits. Their development for high tension is, however, a thing of the future, and has to cope with many difficulties, some of which are indicated in the book by the author.

Dr. Benischke's book is to be welcomed as a valuable contribution to a subject to which as yet so little attention has been paid.

C. C. G.

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OUR BOOK SHELF.

Catalogue of Scientific Papers (1800–1883), *Supplementary Volume*. Compiled by the Royal Society of London. Vol. xii. Pp. xxxii + 807. (London: C. J. Clay and Sons, 1902.)

THE readers of NATURE must be so familiar with the "Royal Society Catalogue" that it is needless to give any description of it; suffice it to say that when the work for the decade 1874–1883, printed in vols. ix. to xi., was in progress, it was found that a considerable number of periodicals had been omitted, many of which contained valuable papers. As stated in the preface to vol. ix., the President and Council contemplated the publication of a supplementary volume which should contain the most important papers that appeared between 1800 and 1883 in periodicals not hitherto catalogued.

A preliminary list of the omitted serials was made, and after a careful sifting it was found that 355 remained to be dealt with, the titles and abbreviations of which occupy twenty-six pages of the volume. These were catalogued in the same way as the previous portion of the work, but when the matter was prepared for the press it was evident that the amount to be printed was much greater than had been anticipated; the committee therefore decided that references to abstracts of papers that had appeared in previous volumes should be excluded, that all references to abstracts should be excluded except in the cases of papers in some other language than English, French, German, Italian or Latin, abstracts of which had been published in one of these languages, and in such a case reference was to be made to only one abstract. The effect of this curtailment was to reduce the work to about 800 pages.

The papers of each author are numbered as in the previous volumes; it must be noticed, however, that these numbers no longer represent the chronological order of publication.

Great care has been taken to ensure accuracy in the references, and many corrections of errors discovered in previous volumes have been made. Much credit is due to Miss Chambers and Miss Bremner and the ladies working under them, and also to the late Mr. George Griffith, who acted as editor.

The Early Life of the Young Cuckoo. By W. P. Westell. Pp. 26; illustrated. (London: Burleigh, 1902.) Price 1s. net.

IN this little volume the author gives an account of the observations made by Mr. J. Craig, of Ayrshire, during the summer of 1899, as to the manner in which young cuckoos eject the other occupants of the nest in which they happen to have been hatched. Two of the photographs illustrating the work have appeared previously in the *Amateur Photographer* of November 28, 1901, in connection with a lecture by Mr. J. P. Millar; and it would perhaps have been better if the author had definitely informed his readers of this fact instead of merely stating that Mr. Craig's "photographs and observations have by this time been heard of throughout the ornithological world."

Since Mr. Craig's observations have not been previously referred to in NATURE, they may be briefly noticed on the present occasion. At the commencement of June, 1899, Mr. Craig found a titlark's or meadow-pipit's nest containing five eggs, two of which were those of cuckoos. One of the titlark's eggs was broken in order to ascertain how long it had been brooded. In due course two young cuckoos were hatched out, one of the titlark's eggs being by this time broken and the other missing. One cuckoo soon succeeded in ejecting its fellow by carrying it on its back to the edge of the nest and tilting it over in the manner shown in the illustrations. The same process

was repeated when the ejected cuckoo, together with a young titlark, was returned to the nest. Other experiments of a similar nature were made subsequently with nestling buntings. The volume closes with a few general, and by no means original, notes on the life-history of the cuckoo. We are afraid that we cannot congratulate either Mr. Craig or the author on the theory advanced to account for the peculiar breeding-habits of the cuckoo. It is argued that if the bird laid a clutch of eggs in the usual manner the offspring would quarrel among themselves owing to their aggressive habits, the author of this theory forgetting that the disposition in question in the young is doubtless correlated with the present laying habit of the parent.

R. L.

Physics: a Text-book for Secondary Schools. By Prof. Frederick Slate. Pp. xxi + 414. (New York: the Macmillan Company; London: Macmillan and Co., Ltd., 1902.) Price 6s.

THIS book is intended for young people from sixteen to eighteen years of age, and consequently deals with physics of an elementary standard. It is for use in the classroom rather than in the laboratory, and details of practical work have been omitted; whilst considerable stress is laid on ample illustration by means of lecture experiments. There are some diagrams, but no pictures of apparatus or phenomena; these the student is to draw for himself from what he sees. Much of the text is written in a spirit of suggestion or question, with the view of making the student think and reason for himself. In the first section of the book there is very little about kinetics, and ideas concerning force are gained from weight. Newton's laws are not stated formally, and work is not discussed until late in the section on heat.

Altogether we think the standard is very elementary, and it is an open question whether students of the ages seventeen to eighteen would not profit more by a rather deeper study of one or two branches of physics in place of this wide review of the whole subject. This, however, must be left to the individual teacher; some will certainly be delighted with this book, others, we feel sure, will prefer to treat the subject quite differently. S. S.

L'Électricité (dédue de l'Expérience et ramené au Principe des Travaux virtuels). By M. E. Carvallo. Pp. 91. (Paris: C. Naud.) Price 2 francs.

Les Phénomènes électriques chez les Êtres vivants. By M. Mendelssohn. Pp. 99. (Paris: C. Naud.) Price 2 francs.

BOTH these volumes belong to the valuable "Scientia" series of short monographs upon important scientific topics.

M. Carvallo's book contains a concise mathematical treatment of electrical principles based upon the theories of Helmholtz and Maxwell and the principles of virtual work.

The second book contains a complete discussion of electrical phenomena observed in the muscles, nerves, skin, glands, nerve-centres and sense-organs. Separate chapters are also devoted to electrical fish, to the phenomena observed in certain forms of vegetation and to a historical review of the entire subject.

Elementary Chemical Analysis. Distinguishing Tables and Tests. By Prof. P. Carmody. Pp. v + 35. (Trinidad: D. Adamson and Co., 1902.) Price 2s. 6d.

IN those laboratories where a course of qualitative analysis is the plan adopted to give a knowledge of practical chemistry, these tables may prove useful. The reactions for the metals and acids are arranged in a tabular form, and by means of the tables the student learns, not only the ordinary methods of separation for the metals, but also their other distinctive tests.

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LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

"The Primrose and Darwinism."

I DESIRE to make a short reply in answer to two or three of your reviewer's criticisms on "The Primrose and Darwinism," and on its author, which appeared in your issue of August 28. "We do not propose," to adopt the words of your reviewer, "to go through the whole review, but to discuss one or two points and to leave your readers to judge of the remainder."

My first and chiefest point is in reference to the charge which the reviewer makes in the following statement (p. 411):—"The only point which is worthy of notice" (relative to the cleistogamic flowers) "is a quotation (Prim. and Dar., p. 191) from Darwin's 'Form of Flowers,' which has several copyist's mistakes, and, moreover, contains interpolated words which do not occur in the original, the whole being within inverted commas. It is this sort of treatment of Darwin's text that makes it almost impossible to read the 'Field Naturalist.'"

I give here an exact copy of Darwin's paragraph from "Form of Flowers," p. 323, and an exact copy both of words and inverted commas of my own comments on Darwin's statement. It will be evident to every reader that Darwin's own observations are always marked off by inverted commas, and that my own comments are not included within the commas. Your reviewer seems to have read my comment with exceeding carelessness.

Darwin's Text.

"The most singular fact about the present species is that long-styled cleistogamic flowers are produced by the long-styled plants, and mid-styled as well as short-styled cleistogamic flowers by the other two forms; so that there are three kinds of cleistogamic and three kinds of perfect flowers produced by this one species! Most of the hetero-styled species of *Oxalis* are more or less sterile, many absolutely so, if illegitimately fertilised with their own form pollen. It is therefore probable that the pollen of the cleistogamic flowers has been modified in power, so as to act on their own stigmas, for they yield an abundance of seeds" (p. 323 of last edition, 1892).

My own comment.

But in *Oxalis Sensitiva* "the long-styled cleistogamic flowers are produced by long-styled plants; the mid-styled as well as the short-styled cleistogamic flowers are produced respectively by the other two forms; so that there are three kinds of cleistogamic and three kinds of perfect flowers produced by this one species" (F. Fl., p. 323). Now, as Darwin, from his *net experiments*, concluded that "most of the hetero-styled species of *Oxalis* are more or less sterile, many absolutely so, if illegitimately fertilised with their own form pollen" (F. Fl., p. 323), he had in some way to account for this extreme contradiction in results between the naturally abundant fertility of these cleistogamic flowers, and his own results, which we have given above, of *Lythrum Salicaria*, under the unnatural method of experimenting with his net. Under this difficulty, Darwin suggests, "it is probable that the pollen of the cleistogamic flowers has been modified in power, so as to act on their stigmas, for they yield an abundance of seed" (F. Fl., p. 323. The italics are ours). (Prim. and Dar., p. 191.)

Again the reviewer states that the "Field Naturalist's" sentence (p. 11):—"To attribute the capacity for fertilisation in the unprotected flowers to the bees is perfectly gratuitous, as the flowers under the net (when bees were excluded) 'when they touched the net and the wind blew' produced seeds without any cross-fertilisation"—contains, in the words 'when they touched the net and the wind blew,' an "incorrect quotation" (p. 409).

Darwin's words are:—

"*Salvia tenori*. Quite sterile; but two or three flowers on the summits of three of the spikes, which touched the net when the wind blew, produced a few seeds" (Cr. and S.F., p. 362).

My quotation.

Salvia tenori under the net, Darwin tells us, "was quite sterile; but two or three flowers on the summit of the spikes, which touched the net when the wind blew, produced a few seeds" (Cr. and S.F., p. 362. The italics are ours). (Prim. and Dar., p. 11.)

The quotation is word for word from Darwin in the italicised words; yet the reviewer takes no notice of this, but produces a merely shortened form a few lines below, and which though shortened conveys exactly the same sense, and calls it "an incorrect quotation"!

One more charge of this kind of your reviewer scarcely needs being noticed. But I notice it in order to avoid any misinterpretation if I passed it over. The charge is one in reference to *Sarothamnus scoparius*. Darwin states concerning it (Cr. and S.F., p. 360):—"Extremely sterile when the flowers are neither